#4. $\left|\frac{3n+2}{n-1} - 3\right| = \left|\frac{5}{n-1}\right| = \frac{5}{n-1} < \epsilon = \frac{1}{0.01}$

$\Leftrightarrow n-1 > \frac{5}{\epsilon} = \frac{5}{0.01} = 500$

$\Leftrightarrow n > 501$

$\therefore$ 구하는 N은 $N = 501$ 이다.

#5 (b) $\lim_{n\to\infty} \frac{4.10^n - 3.10^{2n}}{3.10^{n-1} + 2.10^{2n-1}}$ (분모와 분자를 10^{2n-1}로 나누자)

$= \lim_{n\to\infty} \frac{4.10^{1-n} - 3.10}{3.10^{-n} + 2}$

$= \frac{4.0 - 3.10}{3.0 + 2} = \frac{-30}{2} = -15$.

(d) $\lim_{n\to\infty} \left(\sqrt{n^2+n} - n\right) = \lim_{n\to\infty} \frac{n}{\sqrt{n^2+n} + n} \times \frac{\frac{1}{n}}{\frac{1}{n}}$

$= \lim_{n\to\infty} \frac{1}{\sqrt{1+\frac{1}{n}} + 1}$

$= \frac{1}{2}$.

(f) $\lim_{n\to\infty} \left(2^n + 3^n\right)^{\frac{1}{n}} = \lim_{n\to\infty} \left\langle 3^n \left(1 + \left(\frac{2}{3}\right)^n\right)\right\rangle^{\frac{1}{n}}$

$= 3 \lim_{n\to\infty} \left(1 + \left(\frac{2}{3}\right)^n\right)^{\frac{1}{n}}$

$= 3 \lim_{x\to\infty} \left(1 + \frac{1}{x}\right)^{\frac{\ln\frac{3}{2}}{\ln x}}$

$x = \left(\frac{3}{2}\right)^n$ → $\ln x = n \ln\frac{3}{2}$, $\frac{1}{n} = \frac{\ln\frac{3}{2}}{\ln x}$

$= 3 \cdot \lim_{x\to\infty} \left(1 + \frac{1}{x}\right)^{x \cdot \frac{\ln\frac{3}{2}}{x \ln x}}$ ($\frac{\ln\frac{3}{2}}{x\ln x} \to 0$)

$= 3 \cdot e^0$

$= 3$.

Q.E.D.